PREDATOR COMPENSATION PROGRAMS: A STATE OF KNOWLEDGE REPORT

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Predator Compensation Programs: A State of Knowledge Report

~ Final Project Report ~
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Executive Summary

This literature review is based on an extensive search of databases and reference listings and is in conjunction with an annotated bibliography of literature relevant to the issue of predator compensation programs. The literature review focuses on available literature describing the characteristics of predator compensation programs both nationally and internationally. It also explores prior research on public attitudes/opinions relevant to the issue of predator compensation programs in the United States.

Detailed information was available on 16 predator compensation programs in the United States as well as numerous predator compensation programs in Canada and Europe. In the United States the species most often compensated for include wolves, grizzly bears, black bears, coyotes and mountain lions. Additional species are compensated for in compensation programs worldwide. The most notable differences across programs occurred with payments and funding sources. The various programs differed in the amounts paid for livestock losses. Most compensation programs will compensate 100% of the market value for verified losses. However, Utah's has a set annual pool of compensation funds ($100,000) which is allocated proportionally among the verified claims. Idaho requires claims to be greater than $1000 and claimants have a $1000 deductible that is not compensated. In addition, several programs do compensate for unconfirmed/probable losses. For example, both Alberta and Defenders of Wildlife will compensate 50% of the market value for unconfirmed losses. Wyoming, however, uses a multiplier for lost livestock in conjunction with verified claims. In addition, several programs will compensate for veterinary costs for injuries caused by predators.

Payment schedules among the various compensation programs vary. For many programs it takes several months (2-4 months). In Utah, however, it can take up to a year, depending on when the report was submitted, since payment values are decided on June 30th and in the

Abruzzo region in Italy it takes on average of 16 months for payment. On the other hand, in the French Pyrenees, payments take only three weeks on average. Payment times are important because the rapidity of payments can impact the efficiency of the compensation program, and ultimately their effectiveness in increasing social tolerance.

Almost all the programs identified require that proper authorities verify all claims to make sure that qualifying species caused the damage. This, however, is not always true with the compensation program that exists in North Carolina for red wolves. The compensation program in North Carolina for red wolf damage, on occasion, utilizes a "good neighbor" policy which places the burden of proof on the US Fish and Wildlife Service to prove that it was not a red wolf that caused the damage.

Several programs require preventive measures to be in place before claims can be compensated. In the United States, Colorado has such a requirement, however, it is not always enforced. In several European programs, there are extensive preventive measures required including such measures as using guard dogs, hiring more herders, fencing flocks of sheep, and removal of carcasses. For example, Portugal requires 1 shepherd and 1 guard dog per 50 free roaming sheep or goats; 1 guard dog per 50 enclosed sheep or goats; groups of 8 free-roaming horses and cows; and the guarding of groups of less than 8 horses and cows. Notably, in a regional compensation program within Russia, they do not require preventive measures and do not promote the reduction of livestock depredation by Amur leopards and Siberian tigers because deer farms are an important additional food source for these endangered species. Finally, several compensation programs in Europe also require the land to be open to hunting to lower the predator populations.

The administration of programs is often coordinated by state/regional agricultural agencies or state/regional wildlife agencies. However, several programs, such as Defenders of Wildlife, are administered by a nongovernmental organization. Although one agency or organization may be responsible for the administration of the program, it is often a coordinated effort between several agencies. For example, Defenders of Wildlife distributes the payments but has governmental agencies verify the claims. Several state/regional programs also use this coordinated strategy. Furthermore, funding sources for compensation vary across the different programs. Sources of funding include state appropriations, hunting license revenue, damage stamps, private donations through nongovernmental organizations, and insurance.

Prior research on public attitudes and opinions toward issues related to predator conservation has primarily emphasized attitudes toward specific predators and reintroduction efforts in general rather than compensation programs in particular. With respect to overall attitudes toward predators, prior research indicates that in most cases the majority of the public supports reintroductions, but that there is an increase in opposition with increasing proximity to the reintroduction site. There is also a trend toward increased local opposition with the passage of time. However, most of the research on these issues has focused on support/opposition to proposed policies rather than on actual reintroduction programs or existing populations. These studies also suggest that supporters are more likely to change their views than opponents with time and/or when presented inducements meant to address conflicts (such as compensation) and increase tolerance. However, here again the primary focus has been on hypothetical scenarios rather than existing programs. Additionally a study in the Ninemile Valley of Montana conducted approximately six years after recolonization by wolves indicated that if the Defenders

of Wildlife's compensation program did not exist, 41% of those who currently supported the presence of wolves might change their opinion.

Research exploring reasons underlying opposition to predator reintroductions indicates that concerns related to human safety are the greatest source of opposition to grizzly bear reintroduction. Obviously this is a concern that cannot be directly addressed by compensation programs. And, in fact, results from one study indicate that rapid assistance for dealing with problem bears was a greater potential inducement for increasing support than compensation. In contrast, for western states at least, research indicates that concerns related to livestock issues are the primary source of opposition, suggesting that compensation for wolf depredation possibly has a greater potential for increasing social tolerance with respect to this species in comparison to grizzly bears.

Research focusing specifically on the question of public support for predator compensation programs has produced mixed results. Some studies indicate majority support and others found the majority opposed. Due to the variety of factors that might account for the differences in findings (type of species being evaluated, species status [e.g., endangered versus abundant], type of agency funding/administering the program, study population, question wording) and the limited and varying research contexts it is difficult to draw any firm conclusions or generalizations from previous research, indicating a strong need for further research on this topic.

In addition to the findings from previous scientific research, a brief review of popular literature was conducted to identify arguments, rhetoric, and communication strategies being used by opponents to predator conservation/reintroduction. The six most common themes relevant to the success/acceptability of predator compensation programs were: (1) the potential

conflict between the very concept of compensation and livestock producers' norms of responsibility their livestock; (2) questions about whether compensation for specific losses adequately cover the true costs of living with predators; (3) perceptions that absent predators can never really be reintegrated into what some describe as contemporary agrarian ecosystems; (4) deeper political concerns related to power and control with respect to government agencies and environmental groups; (5) skepticism about whether nongovernmental organizations are sincerely interested in resolving conflicts or are merely using predator reintroduction/compensation as publicity mechanisms, and (6) fear appeals. In some cases these argumentation strategies may be merely tactics employed by opponents looking for any arguments they believe will sway various segments of the public to their side while in other cases they may reflect true underlying concerns. In either case these themes represent potential barriers to public acceptance of compensation programs and should be evaluated by research geared toward understanding the effect and public acceptance of compensation programs.

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Introduction and Objectives

Effective environmental conservation requires an understanding of more than just ecological and biological principles because environmental decisions are made in a cultural and political context in which ecological knowledge is only one of many factors. To be effective, environmental decision makers need to understand public discourse about social values, stakeholder interests, and formal and informal claims on natural resources. They also need to be able to translate public discourse about values into shared, or at least mutually acceptable social goals; to identify socially acceptable conservation strategies to attain these goals; and to successfully implement these strategies (Duane, 1997, p. 779; Fairfax, Fortmann, Hawkins, Huntsinger, Peluso, and Wolf, 1999). With respect to contemporary environmental crises, predator reintroduction and carnivore conservation is one of the most controversial issues.

The Endangered Species Act of 1973 was a strong statement about the importance of wildlife preservation in contemporary American culture. By the 1990s social and political support for endangered species recovery had gained sufficient momentum that predator reintroduction efforts were possible. This issue has relevance for social and natural resource policy nationwide. For example, while the reintroduction of wolves into Yellowstone National Park is often touted as a national success, other wolf reintroduction efforts have come upon increasing opposition. In Arizona, of the first 11 wolves released, 5 were illegally shot in what is believed to have been a deliberate attempt to undermine the reintroduction process. In the east, the Recovery Plan for the Eastern Timber Wolf, has recently found opposition in New Hampshire. A bill (HB 240) introduced in the State would prohibit reintroduction efforts in New Hampshire as well as discourage reintroduction efforts elsewhere in the Northeast. In North Carolina a recent court case (Gibbs et al v Babbit) challenged the constitutionality of the U. S. Fish and Wildlife Service regulation limiting the taking of reintroduced red wolves while on

private land. In Minnesota, Governor Ventura has proposed the hunting of gray wolves. Thus, despite the successful establishment of recent attempts to reintroduce predators, addressing social conflict and increasing social tolerance for predator reintroduction and management remains a significant issue in endangered species restoration and management. Beyond this, the controversies surrounding wolf reintroduction reflect a deeper social and cultural struggle between very different views of the world and human's place in it. Supporters and opponents of predator restoration are engaged in a profound social debate involving "differential access to social power, conflicting ideas about private property, and divergent beliefs about humankind's proper relationship with the natural environment" (Wilson, 1997, p. 454). Possible inequity in the distribution of benefits and costs of predator reintroduction is thought to be a particularly important factor in generating social conflict over reintroduction efforts in specific locales.

As a consequence of this possible inequity, several compensation programs are in existence. In 1987, Defenders of Wildlife established the Wolf Compensation Trust with the goal to "shift economic responsibility for wolf [depredations] away from the individual rancher and toward the millions of people who want to see wolf populations restored" (Defenders of Wildlife, 1994, p. 1). In 1997, the Defenders of Wildlife assumed the responsibility for a similar fund established by the Great Bear Foundation to compensate for livestock losses due to grizzly bear depredation. In addition, numerous states and Canadian provinces as well as foreign countries have compensation programs for livestock losses due to predators.

Bangs and Fritts (1996) asserted that the reintroduction of gray wolves to central Idaho and Yellowstone Park "is occurring with less conflict than predicted" (p. 411) and many in the environmental and wildlife management community, as well as in popular press, have credited the Wolf Compensation Trust for contributing to that success (Clark, 1998; Devlin, 1998). The

increase in reintroductions of predator species, especially that of the grizzly bear in the Selway-Bitterroot area, makes this research an important tool for understanding the social conflict about and social tolerance towards predators. While a number of individuals involved in wolf reintroduction efforts perceive these compensation programs as an important component in reducing social conflict associated with reintroduction efforts and sustaining predator populations (Bangs and Fritts, 1996; Clark, 1998; Devlin, 1998), to date no systematic and rigorous evaluation of these programs has been conducted.

The report has two broad goals: (1) to provide an overview of the scientific literature related to predator compensation programs and (2) to describe the nature of existing compensation programs. The literature review documents the existing state of knowledge regarding the nature and effectiveness of predator compensation programs and to identify significant knowledge gaps related to the effectiveness and long term potential of compensation programs. More specifically, this report will cover:

1. Livestock depredation
2. Compensation
    a. Programs
    b. Administration
    c. Procedures
    d. Payments
    e. Damages covered
    f. Types of compensation
    g. Potential problems with compensation
    h. Suggested guidelines
3. Attitudes
4. Policies

This report is not an attempt to criticize or praise the idea of compensation, but instead, attempts to give an understanding of this topic in light of the scientific research done on it. In

addition, it is important to note that the compensation programs discussed are ones in which there was literature available. The focus of the literature review was to identify as many compensation programs and types of programs that are in existence, thus programs were identified on a worldwide scale, not just in North America.

In addition to this report, an annotated bibliography that focuses on literature related to compensation was also produced. The bibliography is organized according to primary themes and includes keywords for searches.

Procedures

This report is based upon two strategies used to gather literature and information necessary to accomplish the study objectives. The first strategy involved a review of scientific articles on compensation and compensation programs. The first step was to search the following databases: Agricola, Zoological Record, Biological Abstracts, Dissertation Abstracts, Sociological Abstracts, Political Science Abstracts, and the University of Minnesota's Social Sciences in Forestry Bibliography. The review focused on literature that addressed the following themes: predator compensation programs; social conflict issues related to species reintroduction and predator control; the state of the art in design and operation of predator compensation/mitigation programs; scientific knowledge regarding effects and consequences of compensation/mitigation programs; scientific assessments of public perceptions/satisfaction with the effectiveness of wildlife management programs; and scientific research regarding social tolerance of wildlife. Searches of the databases were done through the following keywords: predator compensation programs, predator compensation, compensation programs, compensation, predator control, predator mitigation, wildlife management programs, social tolerance of predators, wildlife damage management, wildlife compensation, wildlife depredation, predator reintroductions, wildlife reintroduction, attitudes, predator policy. Appendix A lists what searches were performed.

Attempts were made to find literature on all existing compensation programs worldwide. Although the authors were able to obtain information for programs in the United States, Canada, and most of Europe, it was difficult to find literature on programs in Asia and Africa, even though the authors are aware of some programs existing in those areas, using the search strategies described above. However, the World Wildlife Fund is in the process of doing a

detailed survey of compensation programs worldwide and a report should soon be available. This survey examines the administration and success of compensation programs worldwide.

The second strategy for information gathering entailed contacting federal, state, and provincial agencies that currently have predator compensation programs to gather "gray" literature that documents the history, nature, extent, and effectiveness of existing predator compensation programs. A recent review of compensation programs by Wagner, Schmidt, and Conover (1997) indicated that predator (coyote, bear, wolf, and/or mountain lion) compensation programs exist in 15 states (Colorado, Idaho, Kentucky, Minnesota, Montana, New Hampshire, North Carolina, Ohio, Pennsylvania, Utah, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming) and in 4 Canadian provinces (Manitoba, New Brunswick, Ontario, and Saskatchewan). Each state and provincial compensation administering agency was contacted to identify and gain access to literature regarding these compensation programs. In addition, appropriate representatives for the USDA APHIS Wildlife Services programs were contacted for any literature and reports that they have regarding this issue.

Literature Review

Management of carnivores[1] and particularly reintroduction of carnivores is often fraught with controversy. Not only does it involve emotions at all extremes, but there are financial considerations as well that need to be addressed. These financial considerations include the administrative costs of managing and reintroducing species (approximately $260,000 annually for the federal budget for wolf recovery in Montana (Bangs, 1991)), compensation program costs if applicable, as well as the costs endured by farmers and ranchers for livestock damages and losses. Much of the opposition to carnivores and reintroductions of carnivores pertain to this issue of livestock depredation.

One way to try and alleviate this tension is through compensation programs that pay for damage and losses to livestock caused by predators. This literature review is a first step in attempting to look at compensation programs and evaluate whether they effectively alleviate this tension caused by the coexistence of domestic livestock and carnivorous species in the same area as well as to determine whether compensation programs help to increase the social tolerance/social acceptability of large carnivores in areas where domestic livestock are raised. This literature review examines compensation programs that pay ranchers and farmers for the damage caused to their livestock by carnivores. However, before discussing compensation programs in depth, a general review of information on livestock depredation will first be covered. This discussion on livestock depredation will set the foundation on which the remainder of the report will build upon.

[1] The authors will use the term carnivores throughout this report to acknowledge predatory species (such as coyotes, wolves, grizzly bears, and black bears to name a few). However, the authors acknowledge that several predators (such as grizzly bears and black bears) are actually omnivores and opportunistic predators.

Livestock Depredation

Livestock/wildlife conflicts can occur wherever their ranges overlap. With 401 million ha (991 million acres) of land under agricultural control (which is 45% of total U. S. land surface area) in 1990 (U. S. Bur. Of the Census, 1991; as reported in Conover, 1994), there is a definite need to resolve these conflicts. Although proper management of livestock may help to prevent livestock depredation by predators, losses will occur (Roy and Dorrance, 1976).

In the year 2000, 147,000 head of cattle and calves were lost to predators. In the previous year, 273,000 sheep and lambs were lost to depredation as well. The total amount lost, combining these two years of data, is 420,000 head of cattle, calves, sheep, and lambs totaling a cost of $68,139,000 (USDA, 2000 and USDA 2001). Table 1 illustrates the number of cattle, calves, sheep, and lambs lost to depredation for states that have compensation programs. The western states (Colorado, Idaho, Montana, Utah, and Wyoming) are noticeably more affected by livestock depredation. The number and value of the cattle, calves, sheep, and lambs killed for these five states total 108,200 head at a value of $11,432,000. This indicates why many western ranchers are concerned about the reintroduction of more predatory species in the West; they don't want to lose more livestock.

Oftentimes, livestock depredation peaks occur with the calving and foaling seasons (Cozzo, Fico, Battistini, and Rogers, 1996; Camarra, 1987; Mysterud and Warren, 1991; Dorrance and Roy, 1976; Klebenow and McAdoo, 1976; Nass, Lynch, and Theade, 1984; and Fritts, Paul, Mech, and Scott, 1992). However, the number of wolf depredations may vary between livestock operations and between seasons (Weaver, 1983). Research has shown that in western Canada and northern Minnesota that it is during late summer (July-August) when most wolf depredations occur (Weaver, 1983; Fritts, 1982; Fritts et al, 1992, Gunson, 1982). This

Table 1: Livestock Depredation Figures for States with Compensation Programs: Number Killed and Total Value in Dollars[1,2]

State	Cattle[1]	Calves[1]	Sheep[2]	Lambs[2]	Total
Colorado	500 $376,000	3,000 $945,000	3,000 $297,000	9,000 $603,000	15,500 $2,221,000
Idaho	300 $212,000	2,300 $632,000	2,800 $283,000	7,400 $311,000	12,800 $1,438,000
Kentucky	800 $518,000	2,200 $634,000	not available	not available	3,000 $1,152,000
Michigan		300 $92,000	200 $25,000	1,300 $53,000	1800 $170,000
Minnesota	100 $72,000	1,100 $313,000	1,700 $158,000	2,300 $101,000	5,200 $644,000
Montana	600 $477,000	3,200 $989,000	3,800 $334,000	12,600 $592,000	20,200 $2,392,000
New Hampshire	not available	not available	not available	not available	not available
North Carolina	500 $307,000	2,100 $606,000	not available	not available	2,600 $913,000
Ohio	not available	600 $170,000	700 $99,000	1,200 $53,000	2500 $322,000
Pennsylvania	not available	not available	400 $46,000	900 $44,000	1300 $90,000
Utah	400 $288,000	2,100 $623,000	6,600 $680,000	18,700 $860,000	27,800 $2,451,000
Vermont	not available	not available	not available	not available	not available
Virginia	600 $377,000	2,300 $690,000	900 $100,000	2,500 $113,000	6,300 $1,280,000
West Virginia	not available	900 $236,000	800 $71,000	2,800 $123,000	4,500 $430,000
Wisconsin	200 $140,000	1,200 $457,000	400 $40,000	500 $21,000	2,300 $658,000
Wyoming	300 $234,000	3,600 $1,156,000	6,000 $528,000	22,000 $1,012,000	31,900 $2,930,000
Total US	21,000 $13,524,000	126,000 $38,113,000	77,000 $7,448,000	196,000 $9,054,000	420,000 $68,139,000

1. USDA. (2001). U. S. Cattle and Calves Predator Loss. Washington D. C., National Agricultural Statistics Service, USDA.

2. USDA. (2000). U. S. Sheep and lamb predator loss. Washington D. C., National Agricultural Statistics Service, USDA.

peak has been connected to several factors including: that the denning of wolves during May and June restricts the wolves' movements thus resulting in less contact with livestock during this time (Gunson, 1982); during the late summer pups are in the process of gaining weight which

requires a large amount of food, thus more depredations may occur (Weaver, 1983); during the late summer, cattle and sheep in Minnesota are in open and wooded pastures which makes them vulnerable to depredation (Fritts, 1982). In Italy, the high incidence of adult sheep killed in summer follows the early sale of lambs as well as movement to temporary fields (Cozza, et al, 1996).

Gunson (1982), Fritts (1982), Fritts and others (1992), and Cozza and others (1996) document that most livestock depredation occurs in pastures/range areas that are brushy and wooded. Gunson (1982) indicates that this is primarily along the forest-agricultural fringe area. In addition, research by Fritts and others (1992) indicates a pattern of increased wolf depredations following mild winters and low number of depredations after severe winters. Although "...cause and effect cannot be confirmed, severity of the previous winter seemed to be the best indicator of the level of losses to be expected during a given depredation season" (Fritts et al, 1992, p. 10).

Common domestic livestock prey includes cattle, calves, sheep, lambs, swine, and poultry; however, other livestock are sometimes killed. The most common depredations occur on cattle, calves, sheep and lambs (Fritts, 1982; Fritts et al, 1992; Gunson, 1982; Gunson, 1983). In Minnesota and Alberta, research indicates a preference for calves over cattle (Fritts et al, 1992; Gunson, 1982; Gunson, 1983). However, there does not seem to be a preference of lambs over sheep by wolves (Gunson, 1982).

Most livestock depredations in the United States are done by coyotes (USDA, 2000; USDA, 2001). According to the USDA, coyotes are 64.6% of the total predators for cattle and calves, and 60.7% for sheep and lambs. Bears and wolves make up the smallest percentage of total predators (Table 2). Although bears and wolves make up such a small portion of the

Table 2: Losses of Livestock by Predator in US[1,2]

Predator	Cattle and Calves[1]	% of Total Predators[1]	Sheep and Lambs[2]	% of Total Predators[2]
Coyotes	95,000	64.6	165,800	60.7
Dogs	26,000	17.7	41,300	15.1
Mountain lions and Bobcats	11,000	7.5	28,300	10.4
Bears	2,800	1.9	7,800	2.9
Wolves	1,600	1.1	not available	not available
Eagles	not available	not available	10,700	3.9
All Other Animals	10,600	7.2	19,100	7.0
Total	147,000	100.0	273,000	100.0

1. USDA. (2001). U. S. Cattle and Calves Predator Loss. Washington D. C., National Agricultural Statistics Service, USDA.

2. USDA. (2000). U. S. Sheep and lamb predator loss. Washington D. C., National Agricultural Statistics Service, USDA.

livestock depredations, they are, however, "often perceived as excessively important" (Fourli, 1999: 13). Loose and feral dogs are the second highest killer of livestock (USDA, 2000 and USDA, 2001). This, in conjunction with the high number of coyote depredations, is important because in areas where coyotes and wolves overlap most coyote and dog depredations are attributed wolves (Fritts, 1982; Fritts et al, 1992). In Minnesota, the term "wolf" is often used to refer to both wolves and coyotes (Fritts, 1982). This, in addition to the importance laid on wolf depredations and the fact that there is a compensation program for wolves and not coyotes, has resulted in prejudice among Minnesota farmers to blame wolves for their livestock losses (Fritts, 1982; Fritts et al, 1992).

Gunson (1982), Fritts (1982), Fritts and others (1992), Cozza and others (1996) and Fourli (1999) indicate that livestock depredation is influenced by many factors including the status of wolves, the number of livestock, the quality of animal husbandry, and the relative abundance of prey. Many authors suggest that significant factors to livestock depredation are

certain animal husbandry practices, such as: not removing dead livestock from pastures, calving away from supervised areas, pasturing in brushy or wooded areas; larger flocks and less guarding, and leaving free range animals unattended for long periods of time (Dorrance and Roy, 1976; Mysterud, 1980; Hatler, 1981: in Hoffos, 1987; Fritts, 1982; Bjorge and Gunson, 1983; Tompa, 1983a, 1983b; Hoffos, 1987; Fritts et al, 1992; Mack, Brewster, and Fritts, 1992; Cozza et al, 1996; Fourli, 1999). However, another important point discussed by Dorrance and Roy (1976) and rediscussed in Mysterud (1980) is the fact that when flocks are confined, which often reduces depredation, and depredation occurs, it is much more severe (i.e. more animals are killed). "As a result, predation losses were higher in confined flocks and lowest in range flocks" (Mysterud, 1980, p. 237).

The previous tables demonstrate that livestock depredation by carnivores occurs and therefore, conserving and reintroducing carnivores to areas of livestock producing can have a negative impact on communities that produce livestock. However, research indicates that the amount of depredation is low in regards to the numbers of predators and the availability of livestock (Fritts, 1982; Weaver, 1983; Hoffos, 1987; Fritts et al, 1992). Fritts (1982) proclaimed the low occurrence of livestock depredation as "remarkable in view of the proximity of wolves and livestock in an area where husbandry practices predispose many herds and flocks to depredation by wolves" (p.10). Hatler's research (1981; cited in Hoffos, 1987) illustrates that wolf kills (both verified and suspected) only accounts for much less than 1% of the total cattle on the range. In the many areas where wolves and livestock cohabitate, livestock depredation is not the norm (Fritts, 1982; Weaver, 1983; Fritts et al, 1992).

Nonetheless, some researchers, such as Bjorge and Gunson (1983) feel that livestock loss estimations are too low. They believe that the difficulty in finding dead cattle and calves in large

remote ranges with tree cover makes it hard to determine the cause of death. Therefore, more losses could actually be the result of depredation by carnivores. Furthermore, Fritts and others (1992) indicated that there may be an upward trend in livestock depredation by wolves in Minnesota. They contribute part of this upward trend to the increasing wolf population and expansion into more traditional agricultural land.

Most research indicates that livestock depredation does not seriously impact the livestock industry as a whole; however, the effects of livestock depredation can be devastating to individual ranchers and farmers (Balser, 1974; Dorrance and Roy, 1976; Gee, 1979; Robel, Dayton, Henderson, Meduna, and Spaeth, 1981; Fritts, 1982; Weaver, 1983; Hoffos, 1987; Fritts et al, 1992; Cozza et al, 1996). Reoccurrence of depredation on a single farm and chronic problem farms are often affected by wolf packs, instead of by transient opportunistic individual wolves (Fritts et al, 1992), thus creating different management problems for both the responsible governmental agency and for the farmer and rancher.

Additionally, the real number of head lost to depredation may not be as important as how the livestock owners perceive the severity of damage. Actual damage is often lower than the perceived damage, *but* it is perceived damage that influences public opinion (Fourli, 1999). Conover (1994) reported that 53% of the respondents felt that their losses (both crop and livestock) exceeded their tolerance levels. Furthermore, 39% of the National Farm Bureau Convention participants said that wildlife damage (both crop and livestock) was so severe that they were less willing to provide for wildlife habitat on their property. This is especially important in areas where private land is vital for the conservation of certain species.

Although most people outside of the farming and ranching community do not perceive livestock damage as a major threat to the industry, stockowners disagree. Hoffos (1987)

conducted a study that included investigating the perceptions of three groups of people: stockowners, hunters, and non-hunters. The results showed that 56% of the stockowners agreed that wolves were a serious threat to the economic well being of the beef industry, whereas 60% of the hunters and 75% of the non-hunters disagreed. Furthermore, a majority of stockowners and hunters agreed that without a control program in ranching areas, more depredations would occur (82% and 74% respectively). Only 37% of the non-hunters agreed with that.

This research indicates is that a dichotomy exists surrounding the perceptions about the severity of livestock damages. Livestock owners tend to believe that it is a serious threat to the industry, while the public and researchers disagree. However, for the conservation of predatory species, livestock owners have to be included in on the dialogue and their concerns taken seriously. Although the research indicates that livestock loss to predators is not a serious threat to the industry, individual ranchers and farmers can be severely impacted. In order for the conservation of large carnivores and predators, concern for livestock depredation must be addressed.

Compensation

One method put forth to address livestock depredations and increase the tolerance of carnivores in livestock producing areas is the use of compensation programs. Compensation programs along with other various measures (such as prevention and control of problematic animals) are used in order to increase tolerance for species that cause damage (Fourli, 1999). Furthermore, Fourli (1999) declares that compensation programs are used to "alleviate the economic and social disequilibria caused to one group which was caused by the desire of another group to conserve the wolf and the bear" (p. v). Tolerance of predatory species in livestock

producing areas have lowered in areas where carnivores, once missing, are returning (Fourli, 1999). The use of compensation programs may help to mollify the livestock producing community and reduce the animosity towards the agencies that manage carnivores (Fritts et al, 1992).

Such measures as compensation programs and prevention have the following objectives

- Decrease the negative impact of the conservation of species on human populations located in large carnivore areas, and to
- Decrease the hostile attitude and avoid revenge of the local populations against large carnivores (Portillo, 1996; as cited in Fourli, 1999, p.1).

However, where prevention and control measures are often considered indispensable tools, compensation programs are considered as indispensable only by some. Others may consider compensation as a secondary measure, while still critics believe it to be a non-sustainable tool (Fourli, 1999). Among ranchers some believe compensation to be helpful, others see it as a way for environmentalists to "spruce" up their image (Olsen, 1991) and finally others do not find the underlying principle acceptable. For example, several ranchers have been quoted saying that they don't raise livestock to feed the wolves or grizzly bears (Olsen, 1991; Independent Record, June 16th, 2001). While another said, "When we accept compensation, we're saying it's OK for wolves to kill livestock. Compensation is not the answer to the wolf" (Independent Record, June 15th, 2001).

Programs

Nonetheless, Fritts and others (1992) and Gunson (1982) believe that compensation is helpful in motivating farmers to report claims of depredation. Additionally, Gunson (1982) sees compensation programs as a way to "open channels of communication with agriculturists" (p.

105). Dorrance (1983) thinks that compensation is justifiable on private lands because "the welfare of wildlife on private land is largely dependent on the landowner" (p. 323). Moreover, several states, provinces, and countries believe that compensation programs are worth the effort. Table 3 and Maps 1, 2, and 3 present the states, provinces, and countries that the authors could identify as having compensation programs for livestock depredation.

Table 3: Compensation Programs for Predator Damage to Livestock[1]

State/Province/ Country	Qualifying Species	Administered by	Preventive measures required	Amount Paid
Alberta	Wolves, bears, mountain lions, eagles	Provincial wildlife agency administers, paid by Alberta Conservation Association	No	85% market value at time of death: confirmed 50% if unconfirmed but confirmed kills within 10 km and 90 days
Arizon	Wolvees	Defenders of Wildlife	No	100% market value for verified 50% market value for probables
Colorado	Black bears, mountain lions	State wildlife agency	Yes, but can be interpreted differently	100% market value
Idaho	Black bears, mountain lions	State wildlife agency	No	Agreed upon cost, based on market value 1/3 paid after claim is verified, the remainder is paid at the end of the fiscal year based on the program balance and amount of other claims $1000 deductible to be paid by claimant that is not compensated
Kentucky	Dogs, coyotes	State agricultural agency	No	100% market value, up to $200 horse/mule $250 registered cattle $200 unregistered cattle $40 unregistered swine, goats, sheep $80 registered swine, goats, sheep $6 full-grown goose $10 full-grown turkey $2 other poultry and domesticated rabbit/hare
Manitoba	Black bear	Provincial wildlife agency	?	?

State/Province/ Country	Qualifying Species	Administered by	Preventive measures required	Amount Paid
Michigan	Wolves	State agricultural agency administers and partly funds it, other funding provided by International Wolf Center	?	100% market value
Minnesota	Wolves	State agricultural agency, funded by State legislature	No	100% market value, up to $750/animal
Montana	Wolves, grizzly bears	Defenders of Wildlife	No	100% market value for verified 50% market value for probables
New Hampshire	Black bear	State agricultural agency	No	100% market value
New Mexico	Wolves	Defenders of Wildife	No	100% market value for verified 50% market value for probables
North Carolina	Red wolf	?	?	?
Ohio	Coyote	State agricultural agency	No	100% market value
Ontario	Coyotes, wolves	Provincial wildlife agency	?	?
Pennsylvania	Bear coyote	State wildlife agency State agriculture agency	Yes for beekeeping, no for livestock damage ?	100% market value and veterinary costs ?
Saskatchewan	Bear	Provincial wildlife agency	?	?
Utah	Black bears and mountain lions	State wildlife agency	No	% based on market value, depends on number and value of claims $100,000/year paid out
Vermont	Black bear	State wildlife agency	No	100% market value
Virginia	Black bear	Counties, funded through damage stamps	No	100% market value
West Virginia	Black bear	State wildlife agency, funded through bear damage stamps	No	100% market value
Wisconsin	Black bears	State wildlife agency	No	100% market value if between $250 and $5,250.50
Wyoming	Black bears, grizzly bears, mountain lions Wolves	State wildlife agency Defenders of Wildlife	No No	100% market value for verified, plus have multiplier for unverified losses when owner has verified claim100% market value for verified 50% market value for probables
Austria	Species covered by hunting legislation	Regional authorities, liability falls on hunting associations, paid by insurance	No	100% market value
Belgium – Flemish Region	Game species not hunted (season closed) for 5years	Flemish Community	No	100% market value

State/Province/ Country	Qualifying Species	Administered by	Preventive measures required	Amount Paid
Czech Republic	68 species listed in the Hunting Act n° 512/1992, including bears	The State, paid by the State if damage caused by protected species, otherwise paid by holder of hunting rights	Yes-unstated	100% market value
Finland	Brown bear, wolf, lynx, wolverine, grey seal, Baltic marbled seal	The State is responsible and pays for the compensation	Yes-unstated	100% market value minus the value of any usable derivative products 50% market value for reindeer damage unable to be investigated thoroughly because of weather
France	Bear	State administers through Department of Direction of Agriculture and Forests	Yes, in Alps there must be preventative measures before 4th attack (for wolf and bear damage); however it's rarely enforced	100% market value, 30 euro or 10% of animal value (if > 302 euro) for forgone income, 91 euro for shepherd disturbance, and 100% of veterinary costs paid
	Wolf	Subsidizing associations		110% market value, 0.75 euro per head, with a maximum of 300 heads + 0.6 euro per kilogram of milk lost, and 100% of veterinary costs paid
	Lynx	Subsidizing associations		100% market value
Greece	Bears Wolves	The State	Yes-wardening and enclosures/electric fencing	100% market value 80% market value
India Corbett, Dudhwa, Katerniaghdt, Andhra Pradesch-Nagaziunsagar-Srisailam, Eturnagaram-Pakhal, Bihar-Palamau regions	Tigers	Tiger Conservation Programme through World Wildlife Fund administers and funds most of it Some funding is through NGO partners	?	100% market value
Italy Abruzzo region	Bear, wolf	Regional authority	Yes-guarding	88.6% of market value (ave.), depends on available fund
Abruzzo Park	Bear, wolf	National Park	Yes-guard dogs/electric fences, penning at night	100% market value
Gr. Sasso Park	Bear, wolf	National Park	No	100% market value
Lazio region	Bear, wolf, golden eagle	Regional authority	No	100% market value, unless predator is killed, then no compensation
Maiella Park & (Umbria)-Sibillini Park	Bear, wolf	National Park	No	100% market value, 100% veterinary costs

State/Province/ Country	Qualifying Species	Administered by	Preventive measures required	Amount Paid
Italy (con't)				
Marche	Bear, wolf, golden eagle	Regional authority	Yes-1 guard dog per 50 sheep/goats, enclosures	60% market value, 100% veterinary costs for bears and wolves
Friuli-Venezia	Bear	Regional authority	No	100% market value
Trento	Bear	Regional authority	Yes-electric fencing	100% market value, difference between healthy and injured animal for veterinary costs
(Emilia Romagna) -Gigante Park	Wolf	National Park	No	100% market value and 20% market value for income forgone
Piemonte	Wolf	Regional authority	No	60% market value and 60 euro for every 5 animals killed
Norway	Brown bear, wolf, lynx, wolverine, golden eagle	County Governor, funded by public funds	Yes-unstated	100% market value and 25% market value for owner disturbance
Poland	Bears	State authority	No	? damage to property, but not for loss of earnings
Portugal	Wolf	State authority (The Institute for the Conservation of Nature)	Yes-1 shepherd and 1 dog per 50 free-roaming sheep/goats, 1 dog per 50 sheep/goats in enclosure, groups of 8 free-roaming horses/cows, guarding of groups less than 8 horses/cows	100% market value minus the value of the remains, 100% veterinary costs
Russia Khasanski Rayon Region	Amur leopard Siberian tiger	Phoenix Fund, funds provided by Tigris Foundation	No	Market value
Slovenia	Protected species Species covered by hunting legislation	Ministry of Environment Hunting associations & Ministry of Agriculture	No	?
Spain				
La Rioja	Wolf	Regional authority, paid by either the regional authority, holder of hunting rights, or owner of land where the animal originated	No	?
Aragon	Bear, wolf	Regional authority	No	120% market value and 60 euro for income forgone
Asturias	Bear	Regional authority	No	100% market value and 12-20% of animal value for income forgone
Cantabria, Galicia & Castilla	Bear	Regional authority	No	100% market value

State/Province/ Country	Qualifying Species	Administered by	Preventive measures required	Amount Paid
Spain con't				
Cataluna	Bear	Regional authority	No	200% market value and 60 euro for income forgone
Navarra	Bear	Regional authority	No	100% market value and 300-450 euro for income forgone
Switzerland	Lynx, eagle, carnivores?	Regional authority/Cantons	Yes-unstated	30-50% market value

1. Data comes from several sources including personal communication with different states and provinces, and the following articles:

de Klemm, C. (1996). Compensation for damage caused by wild animals, Council of Europe.

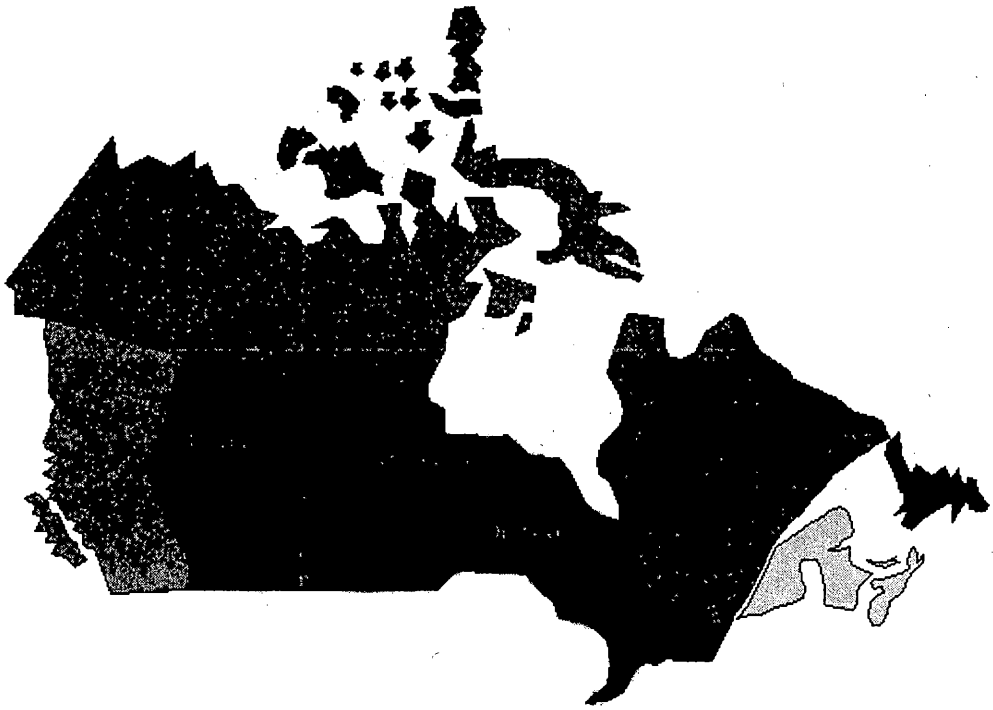
Fourli, M. (1999). Compensation for damage caused by bears and wolves in the European Union. Luxembourg, Office for Official Publications of the European Communities.

Hotte, Michiel & Benuk, Sergei. (2001). "Compensation for livestock kills by tigers and leopards in Russia." Carnivore Damage Prevention News (3): 6-7.

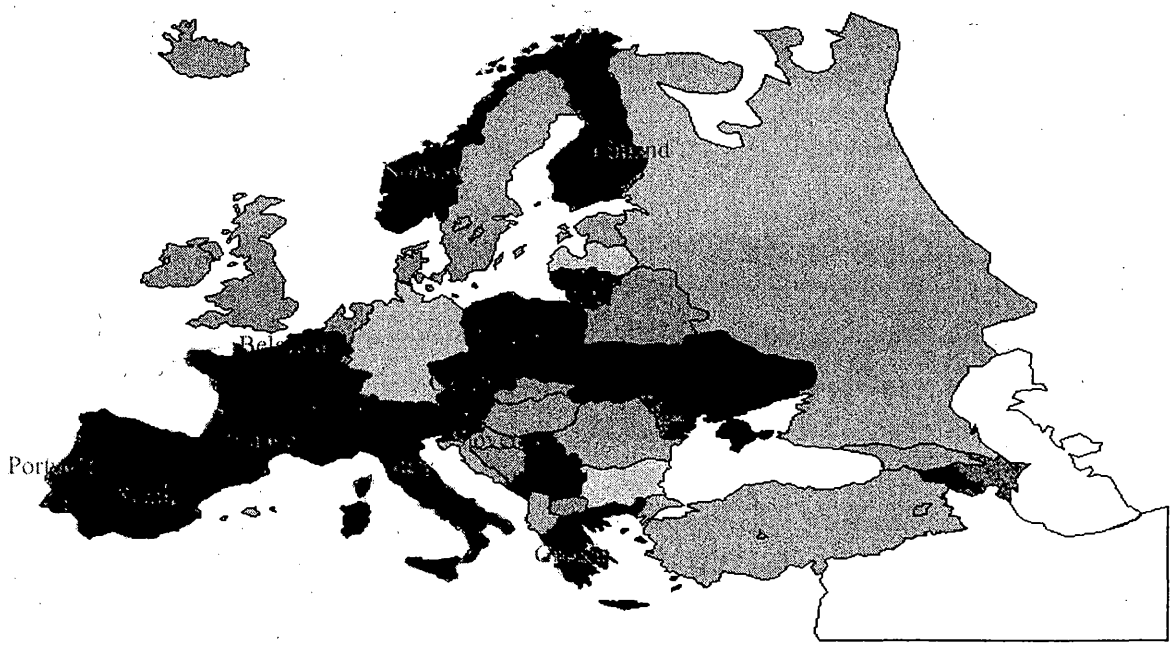
Wagner, K. K., Schmidt, R. H., & Conover, M. R. (1997). "Compensation programs for wildlife damage in North America." Wildlife Society Bulletin **25**(2): 312-319.

Map 1: Map of States with Compensation Programs in United States

Map 2: Map of Provinces with Compensation Programs in Canada



Map 3: European Countries with Compensation Programs



The costs of compensation vary among the states and provinces. On average the total cost for compensating for wolf depredation for one year, including cattle losses, sheep losses, and work time loss by rancher, is estimated at $369,166 (Thompson, 1993).

Table 4 lays out the number and value of claims and the amount of compensation paid out by compensation programs in the United States and Canada. The amounts given are the most recent that were available, and the fiscal year is indicated under the region name. This information came from reports and personal communication with the administering agencies. The range of claims and differences in amounts paid out is quite noticeable.

Table 4: Number and Value of Claims & Compensation Paid Out

Region	Black bear	Grizzly bear	Eagle	Coyote	Wolf	Mountain Lion	Total
Alberta: FY:00-01	19	7	0		83	13	133 claims $74,406.46
Arizona					Defenders of Wildlife		
Colorado FY: 99	$253,743 all damage					$95,571 all damage	162 claims $292,051 (paid for livestock damage) $349,314 total
Idaho FY: 00-01	1					2	3 claims $13,810.20
Kentucky FY 00				49 claims, 43 paid $8,258 (coyote and dog)			49 claims, 43 paid $8,258 (coyote and dog)
Manitoba	X						Not available
Michigan					X		Not available
Minnesota FY 00					82 claims: 144 livestock 514 turkeys 1 horse 29 ducks 42 dogs		82 claims $84,345

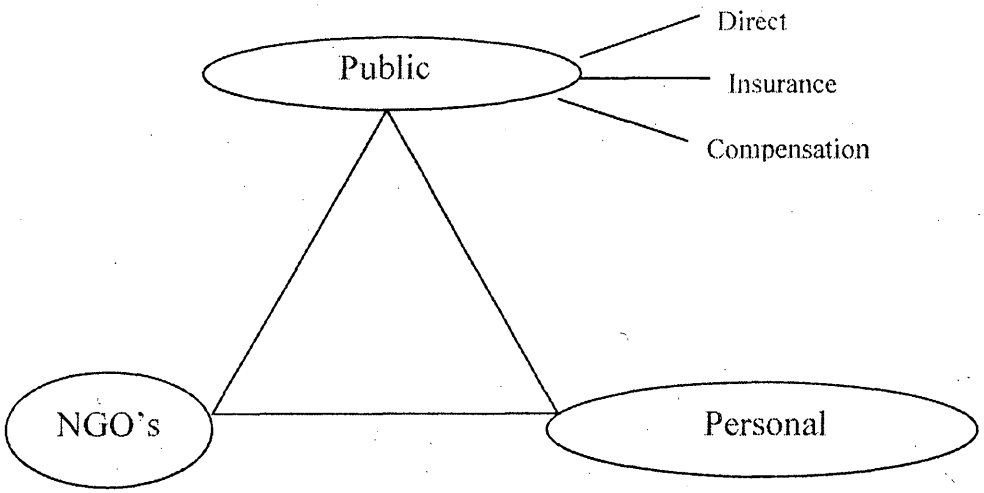
Region	Black bear	Grizzly bear	Eagle	Coyote	Wolf	Mountain Lion	Total
Montana		Defenders of Wildlife			Defenders of Wildlife		
New Hampshire	X						Not available
New Mexico					Defenders of Wildlife		
North Carolina					Red wolf		Not available
Ohio FY 00				254 claims: 535 animals			254 claims $28,000
Ontario				X	X		Not available
Pennsylvania FY 00	59 claims $15,622: 48 poultry 81 beehives 6 goats 5 sheep 35 rabbits 1 horse 31 deer (domestic)						59 claims $15,622 for bear compensation program
Saskatchewan	X						Not available
Utah	X					X	$100,000/year
Vermont	25-30 claims (ave.)/year, mostly beehives $200-250/claim						25-30 claims (ave.)/year $5,000-$7,500 (ave.)/year
Virginia FY 00	X						1 bear euthanized for livestock depredation
West Virginia FY 00	129 total claims, 29 livestock $36,500						129 total, 29 livestock $36,500 total
Wisconsin FY 00	$1068.15 (2 counties)						$1068.15
Wyoming FY 00	13 $24,518 $15,194	17 930,858 $99,093			Defenders	20 42,353 $30,7734	50 claims $997,728 claimed $145,060 paid
Defenders of Wildlife: YR:87-5/01					150 claims 617 animals $160,932		150 claims 617 animals $160,932
Defenders of Wildlife YR:97-4/01		79 claims 188 animals $54,334					79 claims 188 animals $54,334

Tables 3 and 4 illustrate that there are several similarities and differences among and between regions (i.e. states, provinces, and countries). Protected species such as bears, grizzly (brown) bears especially, and wolves are compensated by most of the compensation programs. Other species compensated include: mountain lions, eagles, coyotes, dogs, red wolves, lynx, wolverines, grey seals, and Baltic marbled seals. In the United States and Canada, there are 11 compensation programs for black bears (Alberta, Colorado, Idaho, New Hampshire, Pennsylvania, Utah, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming); 5 for mountain lions (Alberta, Colorado, Idaho, Utah, and Wyoming); 5 for wolves (Alberta, Michigan, Minnesota, North Carolina, and Defenders of Wildlife); 3 for grizzly bears (Alberta, Wyoming, and Defenders of Wildlife) and coyotes (Kentucky, Ohio, and Pennsylvania); and 1 for eagles (Alberta). In Europe, many of the regions that are inhabited by wolves and brown bears have compensation programs for the damage they cause to livestock. Finland and Norway also compensate for lynx and wolverine damage. Finland further compensates for damage caused to fisheries by grey seals and Baltic marbled seals. Norway also included golden eagles in their compensation program.

Types of Compensation

The various compensation programs are using several types of compensation. Figure 1 illustrates the various types of compensation that can be used and that a program can use a combination of types. De Klemm (1996) outlines that public authorities fund some programs while others are funded by non-governmental organizations (NGO's) in addition to personal insurance funding some damage.

Figure 1: Types of Compensation



Public authorities have three methods available to fund compensation: direct compensation, insurance, and compensation funds (de Klemm, 1996). Direct compensation occurs when there is a budget line for compensation in the State's budget. De Klemm (1996) declares that this is the type of compensation used in the Austrian Land of Salzburg, Aragon region of Spain, Finland, Norway, Poland, Portugal, the Czech Republic, and in various Cantons/regions of Switzerland. In the United States and Canada, Utah, Pennsylvania, Minnesota, and Ohio have legislation that sets aside a certain amount of money for compensation of livestock depredation.

Insurance taken out by the administering authority to pay for livestock damages (or wildlife damages in general) does occur in some Italian regions and Cantons of Switzerland. Unfortunately, it is not known if any United States or Canadian programs use this type of compensation.

Compensation funds are a popular type of compensation. Few are funded strictly by the State budget, but instead use various means to create a compensation fund, such as using moneys from hunting licenses and damage stamps. Wyoming and Vermont use hunting license revenue to help fund such programs and Virginia and West Virginia both use damage stamps to fund compensation. In Europe, the Flemish Community in Belgium and the Austrian Hohe Tauern National Park create funds for the compensation of wildlife damage. Oftentimes, compensation by public authorities is a mixed combination of both a fund and budgeted moneys.

Conservation organizations and other types of NGO's are participating more in compensation programs as a way to increase social tolerance of less 'desirable' species. The Great Bear Foundation started a compensation program for livestock depredation by grizzly bears in the Rocky Mountain Front region of Montana. This program helped to spawn the compensation program started by Defenders of Wildlife for wolf depredation on livestock. In France, the State cannot undertake compensation directly, but instead subsidizes associations that then pay the compensation. The Canadian province of Alberta has a similar program where the provincial wildlife service administers the program, but the compensation is funded through the Alberta Conservation Association. However, it should be noted that a portion of the hunting license revenue goes to the Alberta Conservation Association.

Although, Defenders of Wildlife has since taken over the Great Bear Foundation's compensation program for grizzly bears, programs like these, as well as programs like Nature Conservancy and Sierra Club that buy up habitat, allow conservationists to 'put their money where their mouth is'. In addition, Hank Fischer (1989, p.9) discussed the following three advantages to having NGO's administer compensation programs:

1. it avoids the need for government funds, putting financial responsibility directly in the hands of wildlife supporters

2. it reduces the potential for fraud or false claims, a common problem with government compensation programs [however, it is unclear as to how and why or if there's data to substantiate this point]
3. and having conservationists pay for livestock losses will make them more sensitive to the need for effective control of problem animals

However, not everyone is as supportive of NGO's administering compensation programs. De Klemm (1996) believes that NGO compensation programs should be the last resort. He writes, "It should however be seen as the very negation of the public interest in the conservation of endangered species....It would therefore seem that the public interest in the conservation of species, particularly large predators, be clearly established by legislation as well as, as appropriate, the payment of compensation by public authorities for the damage caused by those animals" (p. 41). This illustrates that not only are there debates about if there should be compensation programs, but that there are debates about who should be funding such measures.

Another type of compensation is personal insurance. Insurance may be preferable to compensation because it encourages self-reliance within the livestock industry (Hoffos, 1987). Ranchers and farmers in both Minnesota and Finland are able to take out personal insurance to protect themselves against damage to livestock. Unfortunately, only high-risk ranchers and farmers are most likely to participate and therefore premiums can be high (Hoffos, 1987; de Klemm, 1996). Furthermore, "...it seems unfair to impose insurance costs on potential victims only, given that protective measures for the species concerned have been taken in the general interest" (de Klemm, 1996, p. 40). However, Hoffos (1987, p. 51) denotes that the Cain Commission on predator control in the United States, despondent over the problems inherent in this type of insurance program, developed the following set of conditions to alleviate these issues:

1. That a large number of livestock within any state probably would have to be covered;

2. That losses from all causes would have to be covered because of the impracticality in most cases of determining and validating the actual cause of death;
3. That the industry should accept some loss as part of doing business and that as a consequence only excessive losses would be covered; and
4. That it would be a participating program with livestock growers.

It is, however, difficult to determine the success of these guidelines since little is known about these types of insurance programs and few areas have them.

An alternative compensation scheme that has been proposed in certain countries, such as Sweden and France, suggests giving ranchers and farmers that produce livestock in areas of carnivore activity a fixed compensation amount. The ranchers and farmers are then free to use the money as they wish; however, if depredations occur, they are unable to receive further compensation for those damages (Fourli, 1999). No programs that we examined are using this type of compensation at this time.

Administration

The administration of each program varies according to the region. A state or regional wildlife or agriculture agency most often administers compensation programs. However, in the United States, Defenders of Wildlife, a non-profit organization, compensates for wolf and grizzly bear damage to livestock in some western states. Virginia is an interesting case because the counties administer the program. However, only two counties are currently managing programs.

In Europe, most compensation programs are administered through state or regional authorities; however, some are administered by national parks or subsidizing associations. In addition, LIFE (L'Insturment Financier pour l'Environnement, that is, the European Financial Instrument for the Environment) has also helped regional authorities to administer and fund

compensation programs. Although the programs are often administered by one agency, there actually may be multiple agencies involved to help with the inspections and funding.

Procedures

The compensation procedures for all the programs are rather similar. As soon as the owner identifies damage, s/he must report the damage to the proper authorities. The proper authorities are often the conservation officer/dog warden/or wildlife services individual for that area. The proper authorities then either inspect the damage themselves or bring in another competent authority that can identify cause of death, identify characteristics of the attack and subsequent damage (when, where, how it may have happened; where was the livestock—pasture, confined, etc.), and the cost of damage. This generally includes looking for/at the carcass, inspecting the surrounding area for evidence, and interviewing the livestock owner. This individual reports whether the damage/loss is a positive (verified), possible, doubtful (unconfirmed/unverified), or negative loss or by a specific species. Once a report has been written it often goes to the administrating agency to determine if the claim will be paid (Fritts, 1982; Olsen, 1991; de Klemm, 1996; Fourli, 1999; Paul, 2001). The deadlines for declaring damage differ between programs, but are often between 24 and 48 hours after discovering the damage. Inspections are often done within the next 24 to 48 hours as well since trying to determine the cause of death is time sensitive.

Payments

Table 4 helps to illustrate the differences in payments in various compensation programs. In the United States and Canada, it is common for compensation payments to be 100% of the

market value (at the time of death) of the livestock killed, stipulated that it was a confirmed kill by a qualifying species for compensation (such as wolf, bear, etc.). This is true for the programs in Colorado, Michigan, Minnesota, New Hampshire, Ohio, Pennsylvania, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. However, in Alberta, only 85% of the market value is compensated for confirmed kills, and 50% for unconfirmed kills where confirmed kills occurred within 10 kilometers and 90 days. In the state of Utah, payments have ranged from 57 – 91% of market value. This is because Utah's program holds all the claims until June 30th and then calculates the number of claims and pays proportional amounts of the $100,000 available for payments. If the claims are less than $100,000 then full market value is paid; however, when the value of the claims are over $100,000 then all claimants get only a proportion of the market value. The state of Idaho requires that claims be greater than $1000, and the claimant has to pay a $1000 deductible that is not compensated. The province of Alberta and Defenders of Wildlife will pay 50% of the market value for livestock probably killed, but unconfirmed/unverified. The state of Wyoming uses a multiplier to determine payments for unverified losses in cases where claimants have had verified losses in the same year. The state of Pennsylvania will also pay 100% veterinary costs for black bear damage to livestock. A unique aspect of the compensation program in North Carolina for red wolves is the "good neighbor" policy which stipulates that in some cases it is the responsibility of the US Fish and Wildlife Service to prove that the loss was not a result of red wolves (http://members.nbci.com/mthor/dogs/rwolfstatus.htm).

The amounts paid out in programs in Canada and the United States have remained relatively stable throughout the years. Fritts and others (1992) report that in Minnesota the program's amount paid averaged $21,228 for years 1977 through 1986 (with the highest paid in a year being $38,606 and the lowest $8,668) and remained stable even though public awareness of

the program increased during this time. Nonetheless, the variation between the amounts paid out per year between programs is quite staggering. For example, Ohio paid out $28,000 for 254 claims (fiscal year 2000), Colorado paid out $292,051 for 162 claims (fiscal year 1999), and Minnesota paid out $84,345 for 82 claims (fiscal year 2000). However, these programs are quite different in the species' damage they compensate for; Ohio has compensation for coyote damage, Colorado for black bear and mountain lion damage, and Minnesota for wolf damage. One needs to keep in mind that several factors play a part in the amount of damage and compensation paid out such as population levels of predators, types of predators, types of damage, amounts of cohabitation of livestock and predators, husbandry practices, and funding for compensation.

In Europe, most programs pay 100% of the market value for the livestock killed. Programs that pay less than 100% market value include: Greece (80% for wolves), Italy-Abruzzo region (88.6%, depends on funds, for both bears and wolves), Italy-Marche (60% for bear, wolf, and golden eagles), Italy-Piemonte (60%, for wolves), and Switzerland (30-50% for lynx, eagles, and carnivores). Moreover, there are several programs in Europe that pay either more than 100% market value and/or pay additional costs such as forgone income, shepherd disturbance, and veterinary costs. Several compensation programs will also always pay probable or unconfirmed kills (they are Austria, France-Alps, Italy-Friuli-Venezia, Italy-Trento, Spain-Castilla, and Spain-Cataluna). Many more programs, however, never pay for unconfirmed or probable cases (they include: Greece, Italy-Abruzzo region, Italy-Abruzzo Park, Italy-Gr. Sasso Park, Italy-Maiella Park, Italy-(Umbria) Sibillini Park, Italy-Marche, Italy-Piemonte, Italy-(Emilia Romagna) Gigante Park, Spain-Galicia, Spain-Asturias, Spain-Cantabria, Spain-Navarra, and Spain-Aragon).

Although several compensation programs, both in North America and in Europe, pay for unconfirmed or probable cases, there is debate about if this is a good practice. Many think that paying for unconfirmed cases will help to promote tolerance towards the predators and decrease negative feelings of the livestock community (Olsen, 1991; Fourli, 1999). However, paying unconfirmed cases does not necessarily provide incentive to prevent the damage. This is best stated by Fourli (1999, p. 43) who writes,

> "The point of trying to determine the degree of damage acceptance is that in general a compensation mechanism that covers all types of damage regardless of certain conditions, prolongs a socially risky situation and provides no incentives for the avoidance of certain types of damage. On the other hand, compensation mechanisms that limit the types of damage eligible for compensation, provide incentives for the avoidance of such damage. In addition, a stricter compensation mechanism is likely to limit the cases of fraudulent claims, which constitute a significant problem and increase the financial burden of compensation."

However, partial payments, for both probable cases and verified cases, can become frustrating to livestock owners. A full payment can be seen as taking responsibility for the damage, but then a partial payment seems to say that the agency only takes partial responsibility (Wagner et al, 1997).

Payment Schedules

Payment schedules among the various compensation programs vary. Although it would be ideal to pay verified claim reports immediately, for many programs it takes several months (2-4 months). In Utah, however, it can take up to a year, depending on when the report was submitted, since payment values are decided on June 30th and in the Abruzzo region in Italy it takes on average of 16 months for payment. On the other hand, in the French Pyrenees, payments take only three weeks on average. Payment times are important because the rapidity of

payments can impact the efficiency of the compensation program, since a slow payment does not immediately achieve the objective of reducing social tensions (Fourli, 1999). Furthermore, it may cause livestock owners to practice unacceptable management techniques (Wagner et al, 1997).

Preventive Measures

Several compensation programs require preventive measures to be in place before a rancher or farmer can be compensated for livestock damages. In the United States and Canada, only Colorado's compensation program requires any preventive measures to be in place before the payment is made. However, what these preventive measures should be can be interpreted differently by the field officers, the Wildlife Commission, the Attorney General's Office, and the court system (Mark Leslie, pers. comm., 2001). Nonetheless, if a farmer or rancher has had damages in the past, it is much harder to be compensated unless mitigating measures were practiced.

In Europe, many programs require preventive measures before livestock damages can be compensated. The preventive measures include: the use of shepherds and/or guard dogs, penning herds/flocks at night, use of fencing, and any combination of preventive measures. Portugal's compensation program is quite explicit in the preventive measures that it requires: there is to be at least one shepherd and one guard dog for every fifty free-roaming sheep or goat flocks; at least one guard dog for every fifty sheep or goat flocks in enclosures; free-roaming horses or cows must be in groups of at least eight, and groups less than eight horses or cows must be guarded (Fourli, 1999). Other programs are not as specific and some, such as France's program, is rarely enforced. In addition, most programs require that the land be open to hunting,

thereby allowing a reduction in predator populations (de Klemm, 1996; Fourli, 1999). This, however, is not always feasible with endangered, threatened, or protected species, or in areas with small populations that are being conserved.

Interestingly, in the compensation program in the Khasanski Rayon region of Russia they take a different perspective. For most of the programs discussed already, predator depredation prevention is a component of those programs, however, for the compensation program in the Khasanski Rayon they do not promote measures that will limit the number of livestock kills at deer farms. This is because the Amur leopard and Siberian tiger populations there are dependent upon that additional food source. The compensation program prevents retaliation by the farmers for those losses (Hotte and Bereznuk, 2001).

The goal of preventive measures is to reduce the livestock damage to levels socially and economically feasible and acceptable (Portillo, 1996: as cited in Fourli, 1999). Additionally, research indicates that certain preventive measures and animal husbandry practices can reduce the amount of livestock depredation (Robel et al, 1981; Fritts et al, 1992; Mack et al, 1992; Cozza et al, 1996). Studies done in Minnesota identify three farm management practices that perpetuate depredation. These practices include: leaving carcasses in pastures during winter and spring, calving on pastureland, and pasturing livestock in wooded areas which inhibit monitoring (Fritts, 1982; Fritts et al, 1992). Changing these practices can help to reduce the depredation on livestock. Fritts and others (1992) also argue that if it appears that poor animal husbandry practices are responsible for depredations, than payments should be reduced or withheld, thereby providing farmers and ranchers an incentive for better livestock husbandry practices.

Although the general public may believe that preventive measures are easy tasks for ranchers and farmers, it can be expensive, thus negatively impacting profits (Fritts et al, 1992; de

Klemm, 1996; Fourli, 1999). Furthermore, Hoffos (1987) indicates that poor husbandry practices may result from apathy and ignorance as well as economics. However, survey results showed that respondents were aware of this problem and agreed that poor husbandry practices contributed to wolf/livestock conflicts (Hoffos, 1987). Moreover, few compensation programs supply funds or equipment to help ranchers and farmers with preventive measures. The Defenders of Wildlife programs, however, do help to fund preventive measures such as fencing and guard dogs. In 1999 and 2000, Defenders of Wildlife spent $31,167 for proactive measures to prevent conflict between predators and livestock (Defenders of Wildlife, 2001). By sharing the costs of preventive measures, programs may help to reduce depredations and thereby reduce the amount of payments. In addition, some European programs will help fund preventive measures. In France, Greece, Italy-Emilia Romagna, Italy-Abruzzo, Italy-Marche, Italy-Umbria, Italy-Piemonte, LIFE pays for preventive measures against wolves. LIFE also pays for preventive measures against bears in the following countries: Austria, France, Greece, Italy-Trento, Italy-Abruzzo, Italy-Marche, Italy-Umbria, Italy-Friuli-Venezia, Spain-Pyrenees region, and Spain-Cantabrian mountains region.

Fourli (1999) also points out that the use of preventive measures in one area may just move the depredation problem to another area. In addition, it may reduce a food source for the predator species, thus causing a reduction in the population. This is a consideration in areas trying to conserve populations; other natural food sources need to be available to the predators so they don't prey on livestock.

Damages Covered

As with other factors, the damages covered by various compensation programs differ. Interestingly enough, the livestock covered by the programs varies. Although, we could find limited information on what constitutes livestock for many of the programs, we feel confident saying that compensation programs cover the standard livestock of cattle, sheep, goats, swine and poultry. Variation arises with payments for damage to horses, domesticated fowl, domesticated rabbits and hares, and domesticated 'wild' animals such as deer and elk.

Kentucky, Ohio and Minnesota compensate for damage to all except domesticated 'wild' animals. However, we are unsure of Minnesota's status on compensating for domesticated rabbits and hares. Pennsylvania will compensate for damages to domesticated deer as well as poultry, goats, sheep, cattle, rabbits, and horses. Utah, Vermont, West Virginia, and Wyoming do not fund horse damages.

European programs vary as much as programs in the United States and Canada. Again, we have very limited information on what livestock damages are compensated. We feel confident saying that most to all programs will compensate cattle, sheep, goats, and swine damage. Norway and Finland will also compensate damages to reindeer. However, we are unsure of how horse and poultry damage is treated in the programs.

The types of damage vary in all the programs as well. However, in all cases, damage has to be inspected by the proper authorities before a compensation payment can be made. All programs will pay for verified livestock kills and some will pay for probable kills. Many will also compensate for veterinary costs to livestock injured by predators.

One may expect that higher compensation could be paid in areas of lower damage, however there appears to be an inverse relationship between damage levels and compensation

payments, especially in Europe (Fourli, 1999). This indicates that the more damage that occurs, the less able the compensation program is to covering the costs. It is hard to determine if such a trend is occurring in the United States and Canada.

Potential Problems with Compensation Programs

Although some literature suggests that many believe that compensation programs for livestock depredation are a good investment of public and private funds (Wagner et al, 1997), other literature suggests that there are problems inherent in the compensation programs discussed in this report. The literature reveals that there are several issues that are problematic to the administering, functioning, and efficiency of compensation programs, especially if designed to reduce wildlife/livestock conflicts. Furthermore, there are complaints by recipients that say the livestock value limits are too low; the market value is based on time of loss, not the projected value of when it would be heading to market; and there is no compensation paid for missing livestock, even if there are other verified claims at the farm (Fritts et al, 1992).

Problems seem to impact all compensation types and help to show the complexity of the compensation issue. The following is a listing of the suggested problems associated with compensation programs:

- Compensation programs often do not address the real problem species (Wagner et al, 1997, Fourli, 1999). Coyotes and dogs are the most damaging species to livestock, yet most compensation programs are for species that cause much less damage. This can cause bias and animosity towards the species with compensation programs. This is especially problematic for wolf compensation programs because coyote, dog, and wolf attacks are difficult to distinguish from each other (Fritts, 1982; Fritts et al, 1992; Cozza et al, 1996; Wagner et al, 1997; Fourli, 1999). Fritts and others (1992) stated that there were several instances in Minnesota where the wolf compensation program created a bias towards wolves where farmers would attribute the damage to wolves even when overwhelming evidence indicated otherwise. Furthermore, Fourli (1999) cites Dahier and Laquette (1997) who states that in the absence of direct observation, most shepherds will not admit that an attack was caused by a dog. For

compensation programs that are trying to increase the tolerance of wolves by compensating wolf damage, the absence of coyote and dog compensation, in fact, causes the program to have the opposite effect, i. e. increased animosity towards the wolf.

- Financial burden may be too great for compensating authorities (Olsen, 1991; Rimbey et al, 1991; Wagner et al, 1997). Agencies and organizations may become trapped in paying damage claims for an indefinite period.

- A good payment value is difficult to determine (Fritts et al, 1992; Wagner et al, 1997; Fourli, 1999). Ranchers and farmers often complain that payments are too low (Fritts et al, 1992). Therefore, payments based on recent price lists updated at regular intervals (i.e. monthly) and add other costs at percentages of market value will be closer to the real cost endured by the rancher and farmers. However, in some programs, payments are high enough where it becomes profitable to have livestock "eaten" by predators than taken to market (Fourli, 1999).

- Payment for losses (even real cost payments) do not encourage ranchers and farmers to improve animal husbandry or farm management practices (Dorrance, 1983; Fritts et al, 1992; Wagner, 1997; Fourli, 1999). This is especially true when doubtful or unconfirmed losses are always paid (Fourli, 1999). Partial payments to provide incentive for better farm management can be frustrating for recipients that may not be able to afford prevent measures. How do agencies and organizations alleviate the tension between trying to compensate for real costs (to increase social tolerance of these problematic species) and yet provide incentives for improving animal husbandry practices? Perhaps more programs should require preventive measures before payments can be made, however this leads to the next problem.

- Requiring preventive measures can be uneconomical for some ranchers and farmers, thereby increasing their animosity towards predators (Fritts et al, 1992; de Klemm, 1996; Fourli, 1999).

- Slow payments can cause ill will towards predators (Fourli, 1999).

- Variations in payments by different political regions may distort attitudes and treatment of species populations that move across political boundaries (Fourli, 1999).

Suggested Guidelines

Although there are problems to compensation programs, advocates argue they should not be abandoned. Dorrance (1983, p. 322) developed the following guidelines to help dictate the payment of compensation for depredation on private lands[2]:

1. Damage by wildlife species protected by law.
2. Damage to property that constitutes a significant source of income. This criterion ensures that the owner's livelihood is protected, but excludes compensation for damages to pets and hobbies, which may be valued by the owner far beyond their real commercial worth.
3. Damage to property where recognized prevention and control techniques have been employed, or where no effective prevention and control techniques were available.
4. Damage by wildlife species in situations where animal removal is not socially acceptable; e.g., damage by endangered species.
5. Property damage that normally is not covered by insurance.

In addition to these guidelines, the Large Carnivore Initiative for Europe (LCIE) suggest these following guidelines for compensation programs (Fourli, 1999, p. 53):

1. Compensation payment is a passive strategy. For this, it should be linked to the level of preventive measures used by the farmer or livestock raiser.
2. Damage compensation should be equal for all predators present in a given area.
3. The identification of the predator that is responsible for a specific damage is very important. The only exception concerns the distinction between dog and wolf damage, which is technically almost impossible.
4. All canid damage should be covered, including damage which is doubtful (i.e., including damage that could be from feral dogs).
5. Compensation mechanisms should have built-in mechanisms to minimize fraudulent cases.

[2] Dorrance (1983) does not believe compensation is justifiable on public lands since wildlife is a legitimate resource on public lands. Nonetheless, "If a particular use of public land is deemed desirable by society, then appropriate preventive and control techniques should be employed to prevent or reduce wildlife conflict (p.323)."

Following these guidelines would address many of the concerns and problems often associated with compensation programs. Furthermore, Dorrance (1983) suggests the zoning of areas and the areas with a high risk of depredation because wildlife is an integral part of the environment should have minimal compensation. However, areas surrounding refuges and projects with enhanced populations, that are higher than historic levels, should receive high levels of compensation.

It is, however, difficult to determine the efficiency and effectiveness of compensation programs. Attitudes towards predators are not only difficult to determine, but it is even more difficult to distinguish the cause of the attitudes. Even in areas with compensation programs, other factors may affect residents' attitudes. The next section will explore attitudes towards compensation, livestock depredation, and predator conservation/reintroduction.

Attitudes

Public opinion and receptivity to predator compensation programs are essential to their success. Since public support for compensation programs requires acceptance of predator conservation and reintroduction efforts in the first place, general public opinions toward the broader issue of predator conservation are addressed first. A series of studies by Responsive Management regarding wolf and bear reintroductions in various regions of the United States represent the most recent, widespread assessments of public support for predator conservation and these are summarized in Table 5 along with studies by two other researchers. In 10 out of 15 studies, a majority (>50%) of the respondents supported predator reintroduction efforts and in only two cases (Wyoming hunters' support for wolf reintroduction, local Arizona residents' support for wolf reintroduction) did the proportion of opponents exceed supporters (Table 5). In

general, studies show a broader base of support for grizzly bear reintroductions compared to wolf reintroductions.

Two additional trends are apparent across these studies. First, there is a tendency for greater opposition to predator reintroduction as proximity to the reintroduction site increases. For example: in 1995 only 9% of the national public opposed grizzly bear reintroduction, while 26% of the local public opposed reintroduction; in New Mexico, 25% of the state-wide public opposed wolf reintroduction compared to 34% of local residents; only 11% of statewide residents opposed grizzly bear reintroduction in the state of Washington compared to 26% of local residents; and in Arizona only 18% of statewide residents opposed wolf reintroduction compared to 58% in a county where reintroduction was proposed (Table 5).

A second trend is for local opposition to increase as time and publicity about reintroduction proposals increase. For example, among Adirondack Park residents, in a one year period following a barrage of negative publicity about wolf reintroduction, support for reintroduction fell from 76 to 46% while opposition increased from 19 to 42% (Duda, Bissell, and Young, 1998). In this same area, two-thirds of the hunters initially supported reintroduction, but a year later two-thirds of hunters opposed reintroduction. A similar pattern was seen among local residents for grizzly bear reintroduction in the Bitterroot Mountains; opposition to reintroduction in a 2 year period between 1995 and 1997 increased from 26% to 35% while support fell from 62% to 46% (Duda et al., 1998).

Several studies have also examined factors underlying opposition to predator reintroduction. Responses vary by type of species and, in the case of wolves, by region of the country. For grizzly bears, the primary reason for opposition to reintroduction is fear. For

Table 5. Percent of respondents supporting or opposing predator reintroduction efforts.

Species	Site	Year	Nature of Sample	% Support	% Oppose
Grizzly[1]	Bitterroot Mountains	1995	National	77	9
Grizzly[1]	North Cascades	1996	State Residents	77	11
Wolves[1]	Adirondack Park	1996	Local Residents	76	19
Grizzly[1]	Bitterroot Mountains	1995	Western States	74	10
Wolves[2]	Colorado	1994	State Residents	66	29
Grizzly[1]	North Cascades	1996	Local Residents	64	26
Grizzly[1]	Bitterroot Mountains	1995	Local Residents	62	26
Wolves[3]	Arizona	1990	State Residents	61	18
Wolves[1]	White Sands, NM	1995	State Residents	60	25
Wolves[1]	White Sands, NM	1995	Local Residents	52	34
Wolves[1]	Outside Yellowstone	1997	Wyoming Residents	46	43
Wolves[1]	Adirondack Park	1997	Local Residents	46	42
Grizzly[1]	Bitterroot Mountains	1997	Local Residents	45	35
Wolves[1]	Outside Yellowstone	1997	Wyoming Hunters	39	52
Wolves[3]	Arizona	1990	Local Residents	22	58

[1]Duda, Bissell, and Young (1998).
[2]Bright and Manfredo (1996).
[3]Schoenecker and Shaw (1997).

example, in a 1997 study of local residents concerning opposition to grizzly bear reintroduction in the Bitterroot Mountains, 57% indicated that danger to humans was their primary reason for opposing grizzly bear reintroduction (compared to only 15% listing livestock concerns as the reason) (Duda et al., 1998). Similarly, danger to humans was the most common (46%) "primary reason" for opposition to grizzly bear reintroduction among local Washington residents compared to only 3% expressing concerns for livestock (Duda et al., 1998). And in the most

recent study of Wyoming residents (Responsive Management, 2001) the leading reason given by opponents to increasing grizzly bear populations for their opposition was danger to humans (36%) while only 18% indicated concerns for livestock losses was a basis for opposition. Further 44% of respondents indicated they would be unlikely to use outdoor areas where they currently recreate if they were occupied by grizzly bears.

For wolves in western regions, concerns about livestock depredations exceed human safety concerns as a basis for opposition. In Arizona, 65% of opponents to wolf reintroduction listed ranching concerns as a reason for opposing reintroduction while only 36% listed human safety concerns as a concern (Schoenecker and Shaw, 1997). Additionally, in New Mexico, livestock related issues were far more frequently rated as a concern than human safety issues (Table 6). In fact, of the 5 concerns evaluated in the study, human safety was the least frequently identified concern. In Wyoming 72% of wolf reintroduction opponents listed livestock as a reason while only 21% listed danger to humans as a reason for opposing wolf reintroduction (Duda et al., 1998).

In contrast, two studies regarding wolf reintroduction in the east indicate that concerns for human safety exceed concern for livestock as a reason for opposing wolf reintroduction. Among local residents opposing wolf reintroduction in Adirondack Park, 36% indicated a reason for opposition was danger to humans while only 16% indicated danger to livestock was a factor (Duda et al., 1998). Among New York residents, 51% indicated danger to humans was a basis for opposition while only 6% indicated livestock concerns as an issue (Duda et al., 1998).

Table 6. Concerns related to wolf reintroduction among New Mexico residents[1]

	Major Concern (%)	Minor Concern (%)
Wolves will harm livestock	36	35
Restrictions placed on property rights	31	21
Safety of pets	15	30
Reduced elk and deer populations	20	22
Harm to humans	10	24

1. Duda et. al. (1998).

Several studies have examined public perceptions about the concept of compensation as a basis for dealing with livestock depredation. This literature has provided mixed results regarding public acceptability of compensation programs administered by government agencies. One of the earliest studies was a national survey that examined public support for compensating sheep ranchers for coyote depredations as an alternative to killing coyotes (Kellert, 1982). This measure was strongly disapproved by both the general public (74% disapproved) and livestock owners (89% of sheep producers and 93% of cattlemen). However, given the nature of the question, it is impossible to know to what extent respondents were rejecting to the concept of compensation in general versus the suggestion that compensation completely replace killing coyotes as a means of control. In a more recent national survey, Reiter and others (1999) found that 54% of the public believed that individuals should not receive compensation for wildlife damage. When faced with the question of who should pay compensation for wildlife damage, 34% again responded that no compensation should be paid while 41% indicated that private insurance should be the source of compensation. While the majority (56%) of the public felt government agencies should be involved in wildlife damage management, 50% disagreed that

agencies should be involved in compensation (Table 7). Overall, Reiter and others (1999) interpreted the responses to questions about animal damage control as indicating a general agreement that predator control is acceptable, possibly even a right held by agricultural producers, but that compensation is not an appropriate role for government agencies.

Table 7. Public response to questions related to animal damage control issues[1]

	Agree (%)	Neutral (%)	Disagree (%)
Federal agencies should be involved in wildlife damage compensation	27	24	50
Agencies should not be involved in wildlife damage management at all	19	24	56
Predators are a risk that comes with the business of livestock production.	55	27	17
Predator control is unacceptable	17	28	54

1. Reiter et al. (1999).

In contrast, in a study examining opinions of agricultural community opinion leaders, Conover (1994) found greater support for compensation; 30% preferred it as a solution for wildlife damage problems. However, a larger proportion (53%) preferred an active animal damage control program managed by the state or federal government. An even broader base of support was found in a study of Wyoming residents. Duda and others (1998) found that the concept of compensation for wolf depredations was overwhelming supported; 80% of Wyoming residents supported compensation and only 14% opposed. Fifty-six percent of the respondents felt a federal agency should be the responsible agency while 33% felt it should be a state responsibility. Furthermore, 60% of New Mexico residents supported compensation of ranchers for wolf depredation on livestock.

Three studies provide insights into how the public rates compensation relative to other forms of control as a strategy for dealing with animal depredation. In a national study on coyote control, Arthur (1981) found that compensation ranked low on a scale of acceptability (3.2 on a 10 point scale) falling below use of guard dogs (7.1), repellent chemicals (7.0), birth control (5.8), fast poisons (4.3), and ground shooting (4.3). A study from British Columbia (Hoffos, 1987) looked at support for compensation programs as an alternative to wolf control, factoring in relative costs. When costs of compensation programs exceeded costs of wolf control, there was little support for compensation among any of the groups assessed. However, when costs were equal, the majority (61%) of the general, nonhunting public supported compensation. The proportion of livestock owners supporting the option almost doubled, though still fell slightly lower than the proportion opposing (49%). Support among hunters doubled, but still remained low (22%) (Table 8).

A study by Frost (1985) looked at the extent to which compensation for livestock depredations would serve as an incentive for protecting grizzly habitat on private lands by residents of the Flathead Indian Reservation (Table 9). Compensation was among the top three incentives, supported by almost 42% of respondents. However, rapid assistance to bear problems was rated as a far greater inducement, supported by 76% of respondents. A recent study of Wyoming residents by Responsive Management (2001) yielded a similar conclusion. When a question regarding public support/opposition to efforts to increase grizzly bear populations in Wyoming was coupled with the idea of stationing wildlife managers locally to help track bears, inform and educate people, and resolve conflicts, overall support increased from 42% to 61%. However, under the latter scenario opposition did not decrease greatly (it only

dropped from 39% to 33%), indicating that much of the shift came from the undecided rather than the opponents.

Table 8. British Columbia residents' support of wolf depredation compensation programs as an alternative to wolf control when cost of compensation is greater than or the same as wolf control[1]

Type of Respondent	% of Respondents Favoring Compensation when:	
	Cost of Compensation Greater than Cost of Control	Cost of Compensation Same as Cost of Control
Livestock Owners	24	46
Hunters	10	22
Nonhunters	28	61

1. Hoffos. (1987).

Table 9. Support for the three most important inducements to promote grizzly bear habitat protection on private land on the Mission Valley Flathead Indian Reservation[1]

Type of Inducement	% of Respondents
Received rapid assistance if problems w/ grizzly arose	76.1
Felt safe having grizzly bears near	43.4
Received payments for livestock losses	41.6
More information was available on "how to"	38.1
Tax incentives were available	19.5

1. Frost. (1985).

A final study on public perception regarding wolves and wolf depredation issues in the Ninemile Valley of Montana (Wolstenholme, 1996) is particularly interesting because, rather than reintroduction it explores resident perceptions of compensation in relation to a "natural

recovery" population. Furthermore, it roughly parallels the existence of the Defender's of Wildlife wolf compensation program (the program started in 1987 and wolves were first documented in the Ninemile Valley in 1989). Table 10 presents responses to general questions dealing compensation in relation to wolf depredation. Although dealing with pets rather than livestock, the first items suggest that a large portion of respondents (50%) feel a sense of entitlement to compensation even though the wolf population in question is "naturally" occurring rather than reintroduced. Overall, only 38% of the respondents indicated that the compensation program made the presence of wolves more tolerable. Of the 38% suggesting that this program increased tolerance, 75% were already favorable to presence of wolves and only 7.6% said their attitudes had changed favorably over time. Moreover, over half of the cattle producers in the study disagreed with the statement that the program increased tolerance for wolves. (Note,

Table 10. Ninemile Valley residents' responses to questions related to wolf compensation/depredation[1]

	Agree (%)	Neutral (%)	Disagree (%)
If pets are killed by wolves, the owners should be reimbursed for their losses.	50.3	19.4	30.2
The program for reimbursement of verified wolf-related livestock depredation makes the presence of wolves in the Ninemile Valley easier to tolerate.	37.9	26.9	35.2
The program for reimbursement of verified wolf-related livestock depredation makes the presence of wolves in the Ninemile Valley easier to tolerate. (Cattle Ranchers, n=16)	31.2	12.5	56.2
Reimbursement for market value of a cow killed by wolves is not enough to make up for both the loss of the cow and the inconvenience to the rancher.	49.3	21.9	28.8

1. Wolstenholme. (1996).

although the number of ranchers in the sample was small, Wolstenholme estimated that only 10-15 livestock producing households occur in the valley). This may in part be due to the general perception that reimbursement for the market value of cows killed by wolves is not enough to make up for the loss of the cow (49.3% of respondents). Responses to open-ended questions suggest additional possibilities. Several respondents suggested that compensation would not be a satisfactory solution because it conflicted with the sense of duty and responsibility ranchers feel toward their stock, as illustrated in the following quote:

> "I know most nonranchers think [of] cows only as a monetary item, but most ranchers do care about how their animals are treated and having them harassed and killed by a pack of wolves is awful" (pp.51-52).

Other comments based on open ended interviews suggested that insecurity about the long term availability of funds, especially after delisting and difficulty in verifying wolf depredations are factors influencing responses about the degree to which the compensation program increases tolerance.

Table 11 explores factors that might change opinion of supporters of wolf reintroduction. Over 60% of current supporters indicated that land-use changes and failure to respond rapidly to wolves that kill livestock were important factors. Loss of the compensation program was the third most important factor with 41% of current supporters indicating that it might change their position of support.

Table 12 explores factors that might lead those who oppose wolf reintroduction to change their opinion. Overall, opposers were much less likely to indicate that they might change their views, at least in light of the alternatives considered. The effect of wolves on deer and elk numbers was the most important factor (22% of respondents). Additional financial inducement

($5000 for successful denning) provided little additional incentive (only 5% of respondents indicated this might change their opinion). Additionally, prompt and effective control (which seemed to be an important factor in Frost's (1985) study about grizzly bears) was a potential factor for only 9% of respondents.

Table 11. Wolf supporters (n=76) response to whether the following factors might change their support for the presence of wolves in the Ninemile Valley. [1]

	% who might change opinion
If wolf presence in the Ninemile Valley resulted in significant land restrictions.	68
If wolves that kill livestock were not controlled quickly or effectively.	65
If the program for compensation for wolf related livestock depredation ends.	41
If one of your pets is killed by wolves.	39.6
If the number of wolves in the valley increase substantially.	38.7
If research studies show that wolves have longterm affects on deer and elk numbers.	31
If all monitoring by research biologists ends.	24

1. Wolstenholme. (1996).

Table 12. Wolf opposers (n=58) response to whether the following factors might change their support for the presence of wolves in the Ninemile Valley. [1]

	% who might change opinion
If research studies show that wolves have no longterm affects on deer and elk numbers.	22.4
If wolves were monitored on a monthly basis all year round.	12.1
If prompt and effective control was available to handle wolf related problems.	9.2
If wolves that killed pets were killed or otherwise removed.	7.2
If residents received $5000 when wolves successfully denned on their property.	5.2
If residents still receive reimbursement for livestock losses even when they cannot be verified as wolf related.	4.6

1. Wolstenholme. (1996).

Overall, 52% of respondents indicated that they hoped wolves would continue to inhabit the Ninemile valley. However, 88% of the cattle producers indicated that they wished that wolves did not inhabit the valley. Further, during the 8-year period that wolves have been documented to exist in the valley only 8% of the respondents had come to hold a more favorable impression of wolves while twice as many (16%) had come to hold a more negative impression. Wolstenholme concluded that greater positive change can be accomplished through careful management decisions than through education. However, she also noted that most respondents who were not supportive of the presence wolves indicated they would not change their opinion under any management scenario. On other hand, those who currently are supportive of wolves were much more likely to be swayed toward a negative view pending changes in management (as suggested in Table 11).

Potential Barriers to Public Acceptance of Compensation - Themes in Popular Media

In addition to looking at published research on public attitudes and opinions toward predator compensation programs and related issues, a review of "popular" literature (newspaper editorials, anecdotal rather than systematically gathered observations by researchers, etc.) can also provide insights into factors that may represent barriers to public acceptance of the concept of predator compensation. The following section provides a brief overview of six themes representing possible barriers to public acceptance of compensation that emerged from a review of published "popular" literature regarding the concept of compensation. Some of the themes identified below are consistent with ideas reflected in the research on opinions and attitudes reviewed in the previous section. Other themes presented below were not evident in these studies. However, while the themes presented below are not the result of a systematic, scientific

analysis, identifying and understanding potential barriers to public acceptance of policy initiatives like compensation requires an exploration of arguments, rhetoric, and communication strategies employed by opponents in the popular media (Lange, 1993).

The first theme arises from discussions suggesting that the very concept of compensation may conflict with livestock producers' norms of responsibility to their livestock. For example, in an editorial in *The American Enterprise* Hurst (1999) stated:

> "When one of his animals is killed, [a rancher] has failed in his most important task - to protect the animals in his care. ... As a youngster, I was responsible for my mother's chickens. Each day, I fed and watered the hens and gathered the eggs. One day a weasel got into the coop. He went from hen to hen, stopping just long enough to kill each one. I will never forget the sound of those chickens as the weasel did what came natural. .... The economic loss was inconsequential, but I have never felt so helpless. Those chickens were my responsibility and I had failed."

On a very similar note, as previously reported, Wolstenholme (1996) noted that in her conversations with Ninemile Valley residents, one of the study respondents stated:

> "I know most nonranchers think [of] cows only as a monetary item, but most ranchers do care about how their animals are treated and having them harassed and killed by a pack of wolves is awful."

And recently in a presentation to the Montana Stockgrowers Association, a Dillon, MT sheep producer argued against the concept of compensation stating:

> "We don't raise our livestock to feed wolves.... When we accept compensation, we're saying it's OK for wolves to kill livestock. Compensation is not the answer" (*Helena Independent*, 2001).

A second theme that emerged from the review of popular literature focused more on the adequacy of the financial compensation provided in existing programs rather than representing an opposition to the very concept of compensation as was the case in the preceding theme. Editorials in opposition frequently argue that even when livestock producers are compensated for specific losses, the amount does not cover the true costs to livestock producers of having

predators in the area. For example, Hurst (1999) argued that costs such as lost production from surviving sheep and costs associated with preventative measures such as hiring extra herders is not covered by compensation programs. Wolstenholme's (1996) study of Ninemile residents suggests that this perspective may be prevalent in Montana and possibly other western states; 49% of the respondents in this study believed that compensating for the market values of livestock actually lost did not make up for the losses.

A third theme in popular literature against predator conservation that reflects a potential barrier to the success and/or acceptability are arguments that predators are no longer part of contemporary ecosystems. For example having been told repeatedly that his sheep live in wolf habitat a Dillon, MT sheep producer recently disagreed: "This isn't a wilderness ecosystem ... it's an agrarian ecosystem and we're part of it" (*Helena Independent*, 2001). On a similar note, another editorial in *Insight on the News* (Paige, 2000) stated:

> "... endless ranger-mid-wolf games of trap, release, collar, & monitor raise serious doubts of whether reintroduced packs ever truly will be reintegrated into a natural state or survive without having a team of government personnel chasing them over hill and dale, through forest and field, making sure they stay out of trouble and making reparations when they don't".

A fourth theme emerging as a potential barrier to public acceptance of predator compensation programs derives from deeper political concerns related to perceived tensions between government power and control versus individual freedom and self-determination. Based on interviews with residents around Yellowstone, Scarce (1998) wrote:

> "Many residents see [wolf reintroduction] as government at its worst, powerful agents of control bent on ruining their lives and destroying valued freedom."

In addition to skepticism about government run programs, there is skepticism about the involvement of environmental groups and nongovernmental organizations in compensation and predator reintroduction efforts. For example a brief, anonymously written editorial in *Insight on*

the News (2000) noted: "... one has to wonder whether the greenies have an agenda - like getting Montana ranchers to quit trying to raise beef altogether."

A closely related theme targeted at environmental and nongovernmental organizations involved in predator reintroduction and compensation programs attempts to portray their involvement simply as a publicity or fund raising mechanism rather than a sincere interest in resolving social conflicts over predator conservation. For example, in an editorial in the *New Statesman & Society*, Cockburn (1996) expressed the view that "It is hard to raise money on wolves returning under their own steam ... as opposed to being glamorously 'reinvented' by visionary green groups." In an editorial in *Range Magazine*, Skinner (2001) went so far as to calculate what he argued was the "free" publicity Defenders of Wildlife got for a recent press release on their compensation program. Using advertising rates for the *Spokane Spokesman-Review* and an estimate of the number of newspapers that carried the release, Skinner's estimate was that Defenders of Wildlife received $73.6 million in free publicity. Similarly, in a commentary in the Salt Lake Tribune regarding the state of Utah's recent discussions about wolf recovery, Foster (2001) argued that the wolf compensation program was a major fund raising tool for Defenders of Wildlife, but questioned whether they will be able to sustain the program "once people realize that their payments are buying dead cattle and sheep, not tolerance."

The final theme frequently evident in editorials written in opposition to predator conservation and compensation programs are fear appeals. For example, an editorial in *Insight on the News* by Elvin (2001) includes a close up photograph of a wolf's snarling face with canines bared and prominent. And Hurst's (1999) editorial against wolf reintroduction includes a three paragraph excerpt from Joanna Stratton's book, Pioneer Women, about a five night battle between early settlers and wolves attracted by the odor of a sick woman.

Policy

The issue over compensation programs and livestock depredation is often seen as emblematic of much larger social conflicts, such as: legality and liability of wildlife damage, Endangered Species Act legislation, and private property rights. Already discussed are how certain compensation policy issues impact the effectiveness of compensation programs; such as, amounts paid out for compensation, payments for unverified losses, the lack of programs to compensate for coyote and dog damage, and the lack of requirements for better animal husbandry practices. However, to better understand the complexity of compensation and livestock depredations, one needs to better understand the sociopolitical context in which it takes place (Yaffe, 1996).

Although several states, provinces, and countries have compensation programs, it is difficult to determine the legal basis for such programs. Wild animals in most European countries are considered *res nullius*, meaning no one owns them, and therefore, no one is liable for the damages they cause (de Klemm, 1996; Fourli, 1999). Moreover, damage by wildlife as always been considered a natural risk in agricultural production (Dorrance, 1983;de Klemm, 1996; Fourli, 1999), and no one is responsible for such natural risks. Even in the United States, many courts have ruled that the government is not liable for wildlife damage (Musgrave and Stein, 1993).

However, the thought of natural risks have often been tempered by knowing one has the right to defend oneself against attacks and depredations by wild animals (de Klemm, 1996; Fourli, 1999). This changes, though, when wild animals are protected and one cannot defend against attack and damages in the same manner. Some may argue that when species become protected and "self defense measures are not applicable anymore, ... the State may be considered

to be liable for the adverse consequences of legislation which it adopted itself" (Fourli, 1999: p. 1). Additionally, especially in situations with protected species, the government is the only body that can assume certain responsibilities for human/wildlife conflicts in areas where wildlife is under the stewardship of the people (Dorrance, 1983).

To further complicate matters, in the United States, the conservation of species is equally as important to property rights and economic growth (Czech and Krausman, 1999). Additionally, in the Czech and Krausman (1999) study, 56.5% of the respondents agreed that landowners prevented from developing their property because of endangered species laws should be compensated. This is important because species conservation regulations (ESA regulations in the U. S.) affect landowners' economic plans; thereby creating more tension and long lasting political struggle (Czech and Krausman, 1999). Although many people favor compensation, they do not want the Constitution amended to allow compensation (Czech and Krausman, 1999).

This then begs the question of who would be responsible for compensation? Although Dorrance (1983) and de Klemm (1996) support State run compensation programs, States are hesitant to start such programs. There is concern that if compensation programs are started for some wildlife damage a 'slippery slope' effect will occur where they then need to fund all wildlife damage (Olsen, 1991).

Nonetheless, the debate about the legality of wildlife and who should fund compensation programs still does not address the broader cultural, political conflict that appears to be the real issue. Primm and Clark (1996 p. 1037) state that "Wrangling over carnivore conservation is also often a "surrogate" for broader cultural conflicts: preservation versus use of resources, recreation-based economies versus extraction-dependent economies, urban versus rural values, and states'-rights versus federalism." Cohn (1990), Thompson (1993), and Wilson (1997) share

similar sentiments that much of the conflict is around the real issue of control of land, government intervention, and private land rights. It is not compensation and livestock depredation that is the issue, but what carnivore conservation and reintroduction is going to mean for future land uses both on public and private lands. Furthermore, compensation does not address the very real issues of land control, use, and governmental interference into private land rights and uses. The literature begs the question of whether compensation is ever really going to affect the social tolerance of species, since livestock depredation may not be the real issue.

Conclusion

The cohabitation of carnivores and livestock implies that damage will occur. An objective of compensation programs is to help reduce social conflicts with wildlife and improve social tolerance for predators. The literature indicates that compensation programs should only be one of several measures used to solve the depredation problem including preventive measures and improved animal husbandry practices, lethal control for problem animals, conflict resolution, education, and information (Fritts, 1982; Bangs, 1991; Fritts et al, 1992; Pomerantz and Blanchard, 1992; Niemeyer, 1994). However, compensation is often the most frequent suggestion for dealing with depredation, although ranchers and farmers are less supportive of it (Hoffos, 1987). Additionally, compensation may not be suitable for all situations, thereby requiring the practice of other measures.

This project reports that 20 states and provinces and even more countries worldwide have compensation programs for livestock depredation. Compensation programs vary within and between countries on what species damage qualifies, what livestock damages qualify, what agency administers the program, the value of compensation payments, and whether preventive measures are required practice before compensation payments are paid. Most programs in the United States and Canada compensate for bears and wolves (11 programs compensate for black bear damage, 5 for wolves, and 3 for grizzly bears). Additionally, 5 programs compensate for mountain lions and 3 compensate for coyote damage. In Europe, most programs cover either bear and/or wolf damage.

There are different types of compensation that programs utilize including: direct compensation, insurance and compensation funds by public authorities, conservation organization funded compensation, and personal insurance taken by the farmers and ranchers. Each of these is used by various programs; however, there is debate about the best mechanism to

use. Although compensation programs set up by conservation groups are often touted as a way for environmentalists to 'put their money where their mouth is,' some literature questions whether this is the best approach.

Prior research on public attitudes and opinions toward issues related to predator conservation has primarily emphasized attitudes toward specific predators and reintroduction efforts in general rather than compensation programs in particular. With respect to overall attitudes toward predators, prior research indicates that in most cases the majority of the public supports reintroductions, but that there is an increase in opposition with increasing proximity to the reintroduction site. There is also a trend toward increased local opposition with the passage of time. However, most of the research on these issues has focused on support/opposition to proposed policies rather than on actual reintroduction programs or existing populations. These studies also suggest that supporters are more likely to change their views than opponents with time and/or when presented inducements meant to address conflicts (such as compensation) and increase tolerance. However, here again the primary focus has been on hypothetical scenarios rather than existing programs. Additionally a study in the Ninemile Valley of Montana conducted approximately six years after recolonization by wolves indicated that if the Defenders of Wildlife's compensation program did not exist, 41% of those who currently supported the presence of wolves might change their opinion.

Research exploring reasons underlying opposition to predator reintroductions indicates that concerns related to human safety are the greatest source of opposition to grizzly bear reintroduction. Obviously this is a concern that cannot be directly addressed by compensation programs. And, in fact, results from one study indicate that rapid assistance for dealing with problem bears was a greater potential inducement for increasing support than compensation. In

contrast, for western states at least, research indicates that concerns related to livestock issues are the primary source of opposition, suggesting that compensation for wolf depredation possibly has a greater potential for increasing social tolerance with respect to this species in comparison to grizzly bears.

Research focusing specifically on the question of public support for predator compensation programs has produced mixed results. Some studies indicate majority support and others found the majority opposed. Due to the variety of factors that might account for the differences in findings (type of species being evaluated, species status [e.g., endangered versus abundant], type of agency funding/administering the program, study population, question wording) and the limited and varying research contexts it is difficult to draw any firm conclusions or generalizations from previous research, indicating a strong need for further research on this topic.

In addition to the findings from previous scientific research, a brief review of popular literature was conducted to identify arguments, rhetoric, and communication strategies being used by opponents to predator conservation/reintroduction. The six most common themes relevant to the success/acceptability of predator compensation programs were: (1) the potential conflict between the very concept of compensation and livestock producers' norms of responsibility their livestock; (2) questions about whether compensation for specific losses adequately cover the true costs of living with predators; (3) perceptions that absent predators can never really be reintegrated into what some describe as contemporary agrarian ecosystems; (4) deeper political concerns related to power and control with respect to government agencies and environmental groups; (5) skepticism about whether nongovernmental organizations are sincerely interested in resolving conflicts or are merely using predator

reintroduction/compensation as publicity mechanisms, and (6) fear appeals. In some cases these argumentation strategies may be merely tactics employed by opponents looking for any arguments they believe will sway various segments of the public to their side while in other cases they may reflect true underlying concerns. In either case these themes represent potential barriers to public acceptance of compensation programs and should be evaluated by research geared toward understanding the effect and public acceptance of compensation programs.

The literature also suggests that inherent in all compensation programs are several problems including: not compensating for species that do the most damage, the financial burden for agencies may be too great, payment values are difficult to determine, and whether preventive measures should be required. Although the literature suggests there are problems, it also comments that compensation programs should not be abandoned. Furthermore, the literature identifies that there are several guidelines that can be followed to help address and correct the problems often associated with compensation programs.

An objective of compensation programs is to increase social tolerance of predators by compensating for livestock depredations. However, this really is just a surrogate for the larger socio-cultural-political conflicts that surround carnivore conservation and reintroduction, such as private property rights, control and use of public and private lands, and government intervention. To truly increase social tolerance of predators and reduce the conflicts associated with carnivores and livestock, these deep-rooted issues need to be addressed.

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Appendix A: Specific Searches Performed on Databases

Agricola:
Predator compensation programs
Predator compensation
Predator control
Predator mitigation
Social tolerance of predators
Attitudes towards predators
Wildlife compensation
Predator reintroduction
Wildlife reintroduction
Reintroduction
Depredation
Livestock depredation
Wildlife management programs
Wildlife management
Wildlife damage management
Predator control
Endangered species

Zoological:
Predator compensation programs
Predator compensation
Compensation
Predator control
Predator mitigation
Social tolerance for (of) predators
Social tolerance for wildlife
Social tolerance
Attitudes towards predators
Attitudes towards wildlife
Wildlife compensation
Attitudes
Predator reintroduction
Predator damage
Livestock depredation
Wildlife management programs
Wildlife damage management

Biological:
Predator compensation
Predator control
Predator mitigation
Social tolerance for predators
Social tolerance
Attitudes towards predators
Wildlife compensation
Attitudes towards wildlife
Attitudes
Attitudes and wildlife
Livestock depredation
Predator reintroduction
Carnivore reintroduction
Predator policy
Predator and policy
Wildlife management programs
Wildlife damage

Dissertation:
Predator and compensation
Compensation (predator) (livestock)
Perceptions and wildlife
Attitudes and wildlife
Tolerance and predators
Predator and policy
Predator and reintroduction
Carnivore and reintroduction

Sociological:
Predator compensation
Wildlife compensation
Livestock compensation
Predator control
(Social) tolerance (for) and wildlife
Attitudes and predators

Attitudes and carnivores
Attitudes and reintroductions
Carnivores and reintroductions
Predator and policy
Predator policy
Wildlife management
Wildlife and predators
Wildlife damage
Livestock depredation
Carnivore and management
Carnivore and policy
Predator (and) management

Political Science:

Predator (and) compensation
Wildlife (and) compensation
Livestock (and) depredation
Predator (and) control
Social tolerance and wildlife
Attitudes and predators
Attitudes and wildlife
Predator (and) reintroduction
Carnivore (and) reintroduction
Predator (and) policy
Carnivore (and) policy
Predator (and) management
Carnivore (and) management
Predator programs
Wildlife management
Predator reintroduction
Wildlife (and) reintroduction
Endangered species

University of Minnesota's Social Sciences in Forestry Bibliography

Predator compensation programs
Predator compensation
Predator control
Predator mitigation
Social tolerance of predators
Attitudes towards predators
Wildlife compensation
Predator reintroduction
Wildlife reintroduction
Attitudes and predators
Attitudes and wildlife
Predator (and) reintroduction
Carnivore (and) reintroduction
Predator (and) policy